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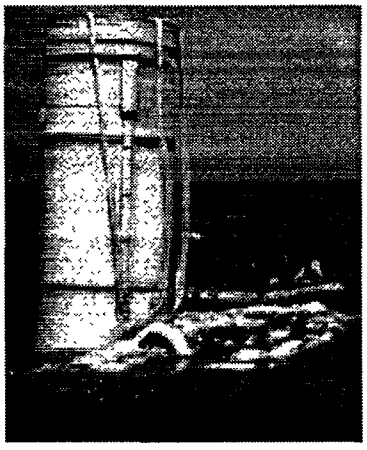
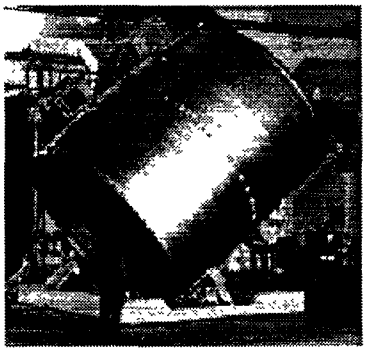
Thiokol Propulsion

The Reusable Solid Rocket Motor (RSRM) Cycle



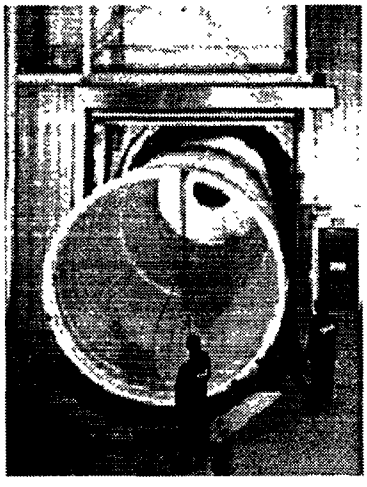
RECOVERY

Once their task is complete, the RSRMs separate from the orbiter and fall, their descent slowed by parachute, to the ocean below. They come to rest approximately 141 miles downrange, floating in a nozzle-end-down position. They are recovered and returned to the mainland, where they are refurbished and prepared for their next Space Shuttle mission.



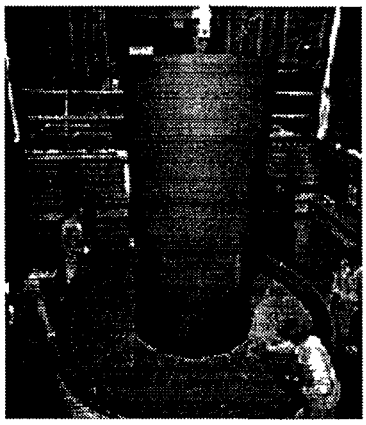
REFURBISHMENT

From Cape Canaveral the empty, washed, and disassembled RSRMs are shipped by railcar back to Thiokol's Utah facilities. With great care, they are *cleaned, inspected, tested, preserved, and stored to* become candidates for a future launch and remain an integral part of the cycle.



CASE PREPARATION

The RSRM case is made up of nine cylinders, an aft dome, and a forward dome. In preparation for their solid propellant, the cylinders are joined into four primary segments. These are called casting segments. Insulation is applied that is capable of protecting the case from the high temperatures of motor operation. The propellant is bonded to this case-protecting insulation.



PROPELLANT CASTING

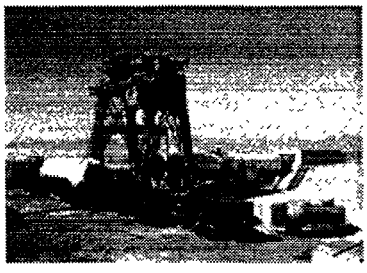
The solid propellant that powers the RSRMs is liquid when poured into the four primary segments that form each motor. The propellant is cured over a period of four days. During this curing process, the propellant solidifies. It requires approximately forty 7,000-pound batches of propellant to fill each segment. A fully loaded RSRM contains over a million pounds of solid propellant.

NOZZLE MANUFACTURE

The nozzle is a complex structure consisting of layers of glass- and carbon-cloth phenolic materials bonded to aluminum and steel structures. These materials are wound at specified angles, then cured to form a dense, homogeneous insulating material capable of withstanding temperatures reaching 6,000 deg F. The cured components are then adhesively bonded to their metal support structures. Finally, the metal sections are joined to form the complete nozzle assembly.

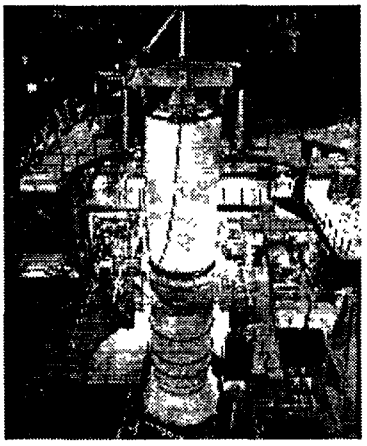
FINAL ASSEMBLY

Before an RSRM is certified for launch, it is x-rayed and ultrasonically inspected to ensure that no flaws or inconsistencies exist in the propellant or insulation. The nozzle is then installed in the aft segment and the igniter is installed in the forward segment. Once the systems tunnel (to carry cabling for the launch vehicle) is in place, the segment is prepared for shipping.



SHIPPING

Loaded RSRM segments designated for flight are moved by transporter to Thiokol's Corinne, Utah, railhead and placed on specially designed flatcars with environmental covers for their journey to Kennedy Space Center.



STACKING

Upon reaching their Florida destination, the segments are removed from their railcars, inspected, and transported to the Vehicle Assembly Building. There, they are vertically stacked to form a complete RSRM and prepared for mating with the external tank. The assembled motors and tank can now be mated with an orbiter and readied for launch.